

WHAT IS CLAIMED IS:

1. A metallic filter for filtering a fluid, the filter comprising:

a filter element for filtering the fluid, wherein a structure of the filter element has been strengthened by a heat treatment after assembly to resist ΔP changes in the fluid to minimize irreversible compression and degradation of the filter element due to partial collapse of the filter element from a rise in the ΔP of the fluid passing through the filter element.

2. A metallic filter according to claim 1, wherein the filter element includes a non-woven, metallic mat.

3. A metallic filter according to claim 2, wherein the filter element further includes at least two metallic support screens, and wherein the non-woven metallic mat is sandwiched between the at least two metallic support screens.

4. A metallic filter according to claim 3, wherein the filter element is formed from a material selected from the group consisting essentially of stainless steel titanium, nickel, Carpenter 20 Cb-3, Hastelloy R and Hastelloy X.

5. A metallic filter according to claim 3, wherein the non-woven metallic mat includes a plurality of metallic fibers, wherein the heat treatment after assembly bonds the fibers in the non-woven metallic mat to each other, and wherein the heat treatment after assembly bonds the at least two metallic support screens to the non-woven metallic mat.

6. A metallic filter according to claim 5, wherein the filter element is pleated and formed to surround a support member, and wherein the heat treatment after assembly occurs after pleating and forming.

5 7. A metallic filter according to claim 5, wherein the filter element withstands at least 500 psi with less than 19% irreversible compression and degradation.

8. A metallic filter according to claim 5, wherein the filter element withstands at least 500 psi with less than 15% irreversible compression and degradation.

10 9. A metallic filter according to claim 5, wherein the filter element withstands at least 500 psi with less than 5% irreversible compression and degradation.

10. A metallic filter according to claim 5, wherein the filter element withstands at least 1000
15 psi with less than 19% irreversible compression and degradation.

11. A metallic filter according to claim 2, wherein the non-woven metallic mat includes a plurality of metallic fibers, and wherein the heat treatment after assembly causes the fibers in the non-woven metallic mat to bond to each other.

20 12. A metallic filter according to claim 11, wherein the filter element withstands at least 500 psi with less than 19% irreversible compression and degradation.

13. A metallic filter according to claim 11, wherein the filter element withstands at least 500
25 psi with less than 15% irreversible compression and degradation.

14. A metallic filter according to claim 11, wherein the filter element withstands at least 500 psi with less than 5% irreversible compression and degradation.

15. A metallic filter according to claim 11, wherein the filter element withstands at least 1000 psi with less than 19% irreversible compression and degradation.

16. A metallic filter according to claim 2, wherein the non-woven metallic mat include metallic fibers, and wherein the non-woven metallic mat is heat treated before assembly to provide a first bonding of the metallic fibers.

17. A method of manufacturing a metallic filter for filtering a fluid, the method comprising the steps of:

providing a filter element;

heat treating a structure of the filter element after assembly to strengthen the filter element to resist ΔP changes in the fluid to minimize irreversible compression and degradation of the filter element due to partial collapse of the filter element from a rise in the ΔP of the fluid passing through the filter element.

18. A method according to claim 17, further comprising the step of forming the filter element from a non-woven, metallic mat.

19. A method according to claim 18, further comprising the steps of:

providing at least two metallic support screens; and

sandwiching the non-woven metallic mat between the at least two metallic support screens.

20. A method according to claim 19, further comprising the step of forming the filter element from a material selected from the group consisting essentially of stainless steel titanium, nickel, Carpenter 20 Cb-3, Hastelloy R and Hastelloy X.

5 21. A method according to claim 19, wherein the non-woven metallic mat includes a plurality of metallic fibers, wherein the step of heat treating after assembly bonds the fibers in the non-woven metallic mat to each other, and wherein the step of heat treating after assembly bonds the at least two metallic support screens to the non-woven metallic mat.

10 22. A method according to claim 21, further comprising the steps of:
pleating the filter element; and
forming the filter element to surround a support member before the heat treating after assembly step.

15 23. A method according to claim 21, further comprising the step of forming the filter element to withstand at least 500 psi with less 19% irreversible compression and degradation.

24. A method according to claim 21, further comprising the step of forming the filter element to withstand at least 500 psi with less than 15% irreversible compression degradation.

20 25. A method according to claim 21, further comprising the step of forming the filter element to withstand at least 500 psi with less than 5% irreversible compression and degradation.

25 26. A method according to claim 21, further comprising the step of forming the filter element to withstand at least 1000 psi with less than 19% irreversible compression and degradation.

27. A method according to claim 18, wherein the non-woven metallic mat includes a plurality of metallic fibers, and wherein the step of heat treating after assembly causes the fibers in the non-woven metallic mat to bond to each other.

5 28. A method according to claim 27, further comprising the step of forming the filter element to withstand at least 500 psi with less than 19% irreversible compression and degradation.

29. A method according to claim 27, further comprising the step of forming the filter element to withstand at least 500 psi with less than 15% irreversible compression and degradation.

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30. A method according to claim 27, further comprising the step of forming the filter element to withstand at least 500 psi with less than 5% irreversible compression and degradation.

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31. A method according to claim 27, further comprising the step of forming the filter element to withstand at least 1000 psi with less than 19% irreversible compression and degradation.

32. A method according to claim 18, wherein the non-woven metallic mat include metallic fibers, and further comprising the step of heat treating the non-woven metallic mat before assembly to provide a first bonding of the metallic fibers.

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